Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
2006		**00-00-2006 to 00-00-2006**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
PSCCE (Production Satellite Configuration Control Equipemnt) to RSCCE (Replacement Satellite Configuration Control Equipment) Transition	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Army Space & Missile Defense Command,Army Forces Strategic Command,Redstone Arsenal,AL,35809**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**2**	

PSCCE to RSCCE Transition

Production Satellite Configuration Control Equipment to Replacement Satellite Configuration Control Equipment

By SGT Joshua W. Pierce

As satellite communications has evolved over the last 25 years, so has the Army's 53rd Signal Battalion (SATCON). The latest example in the Army's evolution of satellite command and control is the transition from the Production Satellite Configuration Control Element (PSCCE) built by Lockheed Martin to the Replacement Satellite Configuration Control Element (RSCCE) built by ITT Industries.

The purpose of the PSCCE and RSCCE are to provide monitoring and payload control of the Defense Satellite Communications System (DSCS) Phase III satellites. Although the equipment is changing, the mission is still the same:

Monitor telemetry to continuously verify health and well being of the satellite, command and reconfigure the communication subsystem of each satellite as directed by the Defense Information System Agency, report satellite operating data, configure data, anomalies and requested information to Defense Information System Agency, the Air Force at Falcon Mission Control and other authorities as directed.

The U.S. Army fielded the PSCCE in the 1980's. The PSCCE utilizes both software and manually controlled equipment, to continuously monitor telemetry for two satellites, while actively commanding one satellite. The PSCCE provides continuous telemetry updates to the operator for both satellites on two of the alphanumeric Cathode Ray Tube displays, commanding and timing data is executed/displayed via the third alphanumeric tube. The command Cathode Ray Tube is dedicated to satellite commanding/verification and ground equipment configuration. The operator can also access a number of predetermined reports via two graphical Cathode Ray Tube's. The PSCCE modular computer will configure predetermined calibrated and non-calibrated data reports. These reports are used by the operator to verify the satellite configuration and welfare, and to perform trend analysis. Due to the limited capabilities of the PSCCE software, reports are largely text based and require careful analysis.

The PSCCE equipment is comprised of four functional sub-systems: control, display, computer and peripheral subsystem; the telemetry and command sub-system; the Earth terminal interface and test sub-system; and the checkout, calibration and test equipment subsystem.

The computer and peripheral sub-system provides the computational and processing capability, memory, data storage and data archival required to run the three PSCCE software programs: System Request Executive, Communications Configuration Program, Improved Jammer Location Electronics Software and the Telemetry and Command Program.

The Telemetry and Command sub-system contains all equipment required to control and monitor the uplink command, downlink telemetry and Single Channel Transponder telemetry flow. The PSCCE requires the following equipment to accomplish both telemetry downlink and command uplink per satellite.

- Single Channel Transponder Decommutator/ Correlator
- Ground Operating Equipment Cryptographic device
- Phase Shift Keying Demodulator
- Telemetry Processing Unit
- Tracking, Telemetry & Commanding Bit Sync
- Time Code Generator
- Single Channel Transponder Bit Sync
- Event Buffer
- Signal Multiplexer
- Phase Shift Keying Demodulator
- Computer Interface Unit
- Command Up-converter.

The Earth Terminal Interface sub-system contains the

hardware devices that link the DSCS Earth terminal radio frequency equipment to the PSCCE telemetry and command subsystem, which includes the Beacon Down-converter and the Beacon Receiver and demodulator. Altogether the PSCCE contains six functional equipment racks, six alphanumeric Cathode Ray Tube's, three graphical Cathode Ray Tube's, six laser jet printers, one dot matrix printer and three computer peripheral racks.

The RSCCE was first conceived in 1994 to replace the PSCCE due to aging hardware/software and to take advantage of DSCS satellite improvements not supported by the PSCCE. The RSCCE is designed to monitor and command a single DSCS satellite and is capable of storing numerous DSCS satellite databases for quick handover and monitoring capabilities, a considerable increase from the PSCCE. This capability enables the Wideband Satellite Operations Center to quickly monitor and restore control of all satellites within the DSCS constellation with minimal downtime.

The RSCCE design utilizes more modern computer technology in the form of an X-window protocol allowing a windowing Man-Machine Interface on the Objective DSCS Operational Control Software workstation. The Windows-based software supports enhanced graphical reports and color-coded displays for each of the satellite sub-systems. Versus the PSCCE's Subsystem Display and SETS reports, the RSCCE compiles a total of 66 reports divided by satellite sub-system all containing calibrated data, all accessible with the click of the mouse. The System Request Executive software utilized by PSCCE requires the operator to enter in string commands to access reports on the graphical Cathode Ray Tube's. The RSCCE reports are easily understood and accessible to even the most inexperienced operator.

The RSCCE equipment design has incorporated multiple processes into one unit, such as the Modulator/Demodulator Unit, which accomplishes the job of the Phase Shift Keying demodulator, TT&C Bit Synchronizer, Signal Channel Transponder Bit Synchronizer and the Signal Multiplexer used by the PSCCE. This drastically cut the total area of the RSCCE to three functional racks versus PSCCE with nine functional racks. The Telemetry Control Subsytem red/black rack controls the Command uplink, Telemetry downlink, and Automatic Fault isolation Loop Back Tests. The computer and peripheral sub-system utilizes commercial-off-the-shelf software such as Open VMS 7.1-2, Oracle CODASYL DBMS V7.0, Oracle RDB V6.1, Oracle CDD V6.1, BE AmessageQ 4.0A RP36, and SL-GMS V6.0 for open VMS.

Automatic fault isolation of ground equipment has been incorporated in the form of software controlled simulated data loop backs, allowing the operator to quickly resolve hardware issues. The PSCCE downlink simulator does provide loop back capabilities, but has proven difficult to program and time consuming when troubleshooting equipment problems. The RSCCE equipment has improved on the PSCCE design by streamlining the equipment to a single lowest replaceable unit, user friendly software displays and reports, automatic fault isolation and software controlled.

The Army's Newest RSCCE Operators

By SSG Woody Scott

LANDSTUHL, Germany — One of the most significant challenges facing the satellite network control operating environment is the dwindling number of Soldiers certified to work the control payload (CPC) position. The CPC is responsible for monitoring the commanding of Defense Satellite Communications Systems (DSCS) satellites which is one of the most crucial functions performed by a Wideband Satellite Operations Center (WSOC).

With the retirement of Elmer Lu Frazier, the operation of the Production Satellite Configuration Control Element (PSCCE) was no longer being taught. This meant that every PCS or ETS that took a CPC certified Soldier out of the unit adversely impacted the ability of the unit to perform its mission.

Each squad felt the burden of maintaining their CPC qualified operators. When scheduling leaves or passes, Squad Leaders had to maintain the minimum number of workers certified to operate the OC floor as well as the minimum number of CPC certified workers.

For Charlie Company, 53rd Signal Battalion (SATCON), the first signs of relief came in the form of a course called the RSCCE (Replacement Satellite Configuration Control Element) course. Charlie Company recently sent ten Soldiers to the RSCCE course. The four-week course taught by Josh Bonesz and Chris Savaglio from ITT Industries gave the Soldiers the skills and fundamentals of the RSCCE system with an emphasis on hands-on practical application. Much of their daily class time was spent on the actual RSCCE equipment in real world scenarios allowing for realistic and effective training.

The new payload controllers of Charlie Company, 53rd Signal Battalion (SATCON) are SGT Patrick Mann (Distinguished Honor Graduate), SPC Shane Hillstead (Honor Graduate), SPC Charles Keller, SPC Quentin Kendall, SPC Brandon Hayman, SPC Ryan Morgan, SPC Ryan Petersen, SPC Michael McIntyre, SPC Konrad Neid, and SPC Michael Simpson.

The four week course impacted the mission in the same way that having ten Soldiers on leave at one time does. The added strain and pressure on the operations floor manifested in shift schedule changes and extra hours for some Soldiers and leaders. However, the difficulty should prove well worth the added burden. Just as an uphill bicycle climb leads to a smooth downhill run, Charlie Company is slowly reaching the crest of the CPC hill and looks forward to a long downhill run of certified operators ahead.